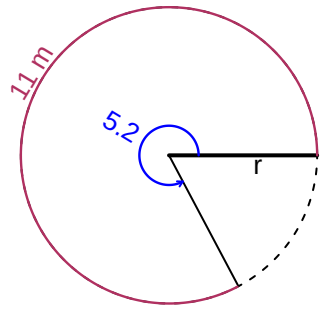
Name: Date:

Trig Final (Solution v30)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 11 meters. The angle measure is 5.2 radians. How long is the radius in meters?

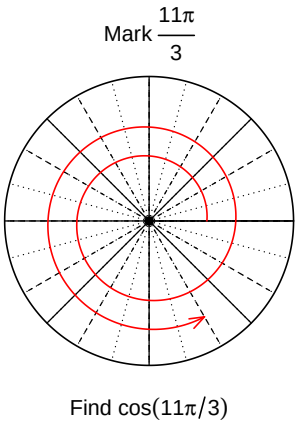


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

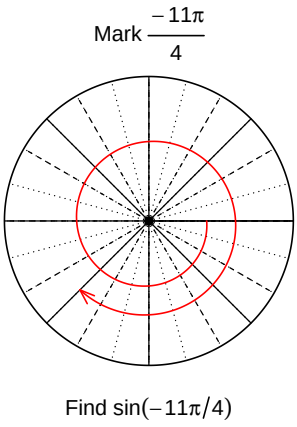
$r = 2.115$ meters.

Question 2

Consider angles $\frac{11\pi}{3}$ and $\frac{-11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{3}\right)$ and $\sin\left(\frac{-11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/3)$



Find $\sin(-11\pi/4)$

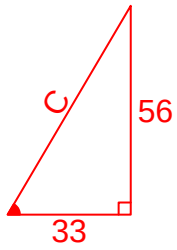
$\cos(11\pi/3) = \frac{1}{2}$

$\sin(-11\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{-56}{33}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

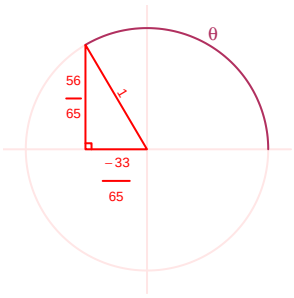
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$33^2 + 56^2 = C^2$$
$$C = \sqrt{33^2 + 56^2}$$
$$C = 65$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{56}{65}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -5.49$ meters, a frequency of 4.32 Hz, and an amplitude of 7.17 meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.17\sin(2\pi 4.32t) - 5.49$$

or

$$y = 7.17\sin(8.64\pi t) - 5.49$$

or

$$y = 7.17\sin(27.14t) - 5.49$$